EXCHANGE RATE IN INDIA: A STUDY OF ITS DYNAMICS AND IMPACT ON MACRO-ECONOMIC PERFORMANCE

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INTRODUCTION

Exchange rate refers to the price of one country's currency expressed in terms of the currency of another country. It is a key financial variable that affects decisions made by exporters, importers, bankers, financial institutions, foreign investors, businesses, tourists and policymakers in the developed as well as developing world. Exchange rate is one of the most volatile variables of the economy. There are numerous variables which affect the exchange rate directly or indirectly. Since the exchange rate is a price, it is affected by demand and supply of the currency directly, and there are factors (chain of determinants) which affect the demand and supply, thus affecting the exchange rate indirectly (Tripathy, 2013). Further, there are variables which affect the determinants of demand and supply and so on.

The foreign exchange (Forex) market provides a forum where the currency of one country is traded for the currency of another country. As regards determination of exchange rate, there have been two mechanisms, viz., fixed exchange rate regime and floating exchange rate regimes. Under the fixed rate regime government decides the foreign exchange rates at which currencies are purchased and sold in the Forex market. Exchange rates are decided against the value of gold per ounce or dollar or pound, and the demand and supply of currency are controlled by the central government. Exporters have to deposit their all earned foreign currencies with the central government and importers have to request to central government to release the forex. The major countries had fixed exchange rates against one another from the end of World War II until 1973. In floating rate system the central banks allow the exchange rate to adjust to equate the supply and demand for foreign currency. There are two types of floating exchange rate system, viz., clean floating and dirty floating. In clean floating exchange rate demand and supply equilibrium determines the exchange rate, whereas in dirty floating rate (also known as managed rate), besides the supply and demand, there is government intervention whenever it's needed to fix the exchange rate.

The demand of foreign exchange in any country is determined by two variables, imports and investment in foreign countries. A country imports goods and services to fill the gap between domestic demand and productivity. It requires relaxation in tariff and import quotas. The foreign investments outside the country are generally affected by stock returns and interest rates. Leonardo (2012) while analyzing the effect of tariffs and real determinants (TAR) on real exchange rate (RER) equilibrium in India observed a positive relationship between TAR and RER. The investors always prefer market with high return and interest. Country with high

returns and interest gets attention of investors that increases the demand for that country's currency, which in turn leads to the appreciation of the currency. The supply of foreign currency depends on two major sources, viz., exports and foreign investment (FII/ FDI). Productivity excess over the domestic demand, export duty and quotas determine the export volume, whereas attractive stock returns and interest rate in domestic market attract the Forex inflow.

EXCHANGE RATE DYNAMICS

Exchange rate dynamics, a broader concept or discipline of exchange rate fluctuations, is study of the behaviour of exchange rate. Numerous factors affect the exchange rate behaviour and these factors also get affected by the exchange rate. There is bidirectional relationship between the exchange rate and its determinants. The economists are of the view that the behaviour of foreign exchange rate is highly dynamic, and it is affected by macro and microeconomic fundamentals, aggregate supply, aggregate demand, nominal, monetary and real shocks, order flow, foreign investment flows (foreign direct and portfolio investment), changes in equity returns, turnover in forex market, interest rates, tariffs and so on.

It is commonly believed that minor and major episodes of economic and financial crisis significantly affect developed as well as emerging markets, but in different ways. In case of developing/ emerging economies, during crisis foreign investors shift capital flows or suck out their investment from the market leading sudden fall in currency value. Major episodes of currency crisis in the past have affected the exchange rate behaviour in the global economy. Economists define the currency crisis as a swift decline of more than 20 percent in the local currency against the dollar. The great depression of 1929, initiated in US stock market was the deepest and longest depression; it affected many economies worldwide, and lasted until the late 1930s or middle 1940s. Economists consider multiple reasons for this great depression. Major among them were bank failures and the stock market crash. The monetary economists point to the monetary factors viz., US Federal Reserve contracted the money supply and Britain's decision to return to the gold standard at pre–World War I parities (US$ 4.86 : £1).

In last three and a half decades, major episodes of currency crises which affected many emerging markets include Latin American Debt Crisis (1982) and the Asian Financial Crisis (1997-98). Main reasons behind these crises were persistent currency account deficit, excessive imports and fewer exports, perverted attempts to change/ lower exchange rates and excessive borrowings from foreign lenders. The recent Global Financial Crisis (2008) started in US economy due to housing bubble burst affected almost all the developed and developing economies of the world because of trading linkages. The emerging markets however did not get affected severely. As a whole through the channel of trade, investment, and productivity the regime might influence the economic growth of the country (Marjan Petreski, 2009). As far relationship is concerned, in studies for developing countries positive

relationship has been found between the exchange rate movement and economic growth i.e. undervaluation (high exchange rate) of the exchange rates facilitate the economic growth (Dani Rodrik, 2008).

Exchange rate affects the trade balance of any country through the Import and export that have a negative and positive relation respectively, with the exchange rate i.e. when the exchange rate increases the national currency become cheap that lead to the increase in export but decrease in the import whereas the volatility of exchange rate facilitate the situation of uncertainty and affect the import as well as export negatively. Exchange rate has significant negative impact on real exports imports, implying that higher exchange rate fluctuation tends to reduce real exports (Jayachandran, 2013). Further, exchange rate dynamics affect the value of international reserves, currency value of debt payments, value of international investment portfolios, and the cost to tourists in terms of the value of their currency. In brief, fluctuations in exchange rates have significant implications on business cycles, trade and capital flows in an economy and are therefore crucial for understanding financial developments and changes in economic policy.

Exchange rate also affects the capital account by influencing the capital flows in the country. When the exchange rate increases, the currency becomes cheaper which may attract the investors and arbitragers and vice-versa. If there is very much volatility in the exchange rate, it shows the uncertainty in the market, thus, leads to decrease in the demand for the currency. When a currency depreciates its value declines relative to the value of another currency, this exchange rate movement has two potential implications for foreign direct investment. First, it reduces that country's wages and production costs relative to those of its foreign counterparts. All else equal, the country experiencing real currency depreciation has enhanced locational advantage or attractiveness as a location for receiving productive capacity investments (Linda, 2006).

EXCHANGE RATE REGIME: INDIAN SCENARIO

During 1950-1951 until mid-December 1973, Indian rupee was pegged to the pound Sterling, except for the devaluations in 1966 and 1971. When the Pound Sterling floated on June 23, 1972, the Rupee's link to the British units was maintained; paralleling the Pound's depreciation and effecting a de facto devaluation. Rupee's ties to the Pound Sterling were broken on September 24, 1975 and then India followed a managed float exchange regime with the Rupee's effective rate placed on a controlled, floating basis and linked to a "basket of currencies" of India's major trading partners. In early 1990's this exchange rate regime came under severe pressures from the increase in trade deficit and net invisible deficit because of increase in oil prices, the RBI took partial action for defending the currency by expending the international reserves and slowing the decline in value. But in the mid of 1991 the reserves

depleted which led the Reserve Bank of India (RBI) to undertake downward adjustment of 18-19 per cent in the exchange rate of Indian Rupee in two stages on July 1 and July 3, 1991.

Following the recommendations of the High Level Committee on Balance of Payments constituted under Chairmanship of Mr. C. Rangarajan, India introduced Liberalized Exchange Rate Management System (LERMS) in March 1992, and adopted first time the Dual Exchange Rate System. This system combined official and market determined exchange rates. Under LERMS 40 percent of the forex earnings had to be surrendered by the companies at an official rate determined by the Reserve Bank of India, which in turn was obliged to sell foreign exchange only for import of certain essential commodities such as oil, fertilizer and life saving drugs besides the Government's debt servicing. The rest 60 percent of the earnings was to be converted as per the market rates. Subsequently, in March 1993, the LERMS was replaced by the Unified Exchange Rate System, and hence the system of market determined exchange rate was adopted. The RBI however, did not relinquish its right to intervene in the market to enable orderly control. (Singh, 2000)

The Foreign Exchange Regulation Act (FERA) enacted in 1973, required that all foreign exchange earnings by companies and residents to be reported and surrendered (immediately after receiving) to Reserve Bank of India (RBI) at a rate which was mandated by RBI but after liberalization, the Government felt the necessity to liberalize the forex policy. Accordingly, FERA was replaced by Foreign Exchange Management Act (FEMA) 2000. FEMA introduced more activities in which a person/ company can undertake forex transactions. The Government also liberalized export – import policy, limits in FDI & FII and cross border fund raising activities to manage forex rate and reserves.

Liberalization facilitated the integration of Indian economy with the world economy specially the financial integration. Due this integration and linkage with the world economy whenever the crisis occurs in world economy there are always chances to Indian economy of getting affected by such crises. If we look at the trends in Rupee Dollar (INR-USD) exchange rate in post liberalization period, it increased from Rs. 31.49 (maximum) in 1993-94 to Rs. 49.06 in 2003-04, and further to Rs. 57.23 in 2012-13. Main causes of these fluctuations were increase in price of oil and petroleum products (RBI). Recently, the Global Financial Crisis of 2007-08 led to the declining forex reserves and rupee value. During 2007-08 the rupee was hovering around Rs. 39-40 per USD, but after the global financial crisis of 2008 the rupee started declining against dollar, fluctuated between Rs. 44-53 vis-a-vis the USD. A considerable fall in Rupee value was observed since early May 2013 indicated by a historic low value of Rs. 60 per USD (June 2013). To control this situation, the Government of India took several measures, such as making upward adjustment in interest rate, ceiling on the foreign currency deposits by non-residents Indians, relaxing the ECB regime for corporate, allowing access to foreign

borrowing to non-banking financial companies and housing financing companies, allowing the rupee-dollar swap facility to the Indian banks to fulfil their short term fund requirement.

After the global financial crisis US government had maintained an ample liquidity (in terms of USD) in the global market by following an easy money policy and keeping the interest rate low that led to the attention of investors to purchase the cheap in dollar market and invest in the emerging countries giving higher returns. This situation led to capital inflow in India, and to control the rupee appreciation RBI continuously involved in purchase of USD. The popular consensus is that the US Federal Reserve Chairman Ben Bernanke announced a gradual phasing-out of its easy money policy that resulted in capital flight in India led to depreciation in currency. Apart from this situation the gradual fall of the rupee had started much earlier due to some India specific factors, e.g. India's growing current account deficit (CAD), inflationary pressures, and slower pace of economic growth and downgrading by some of the international credit rating agencies (Bandyopadhyay, 2013)

REVIEW OF THEORIES AND LITERATURE

In literature, several studies attempted to investigate the sources of exchange rate fluctuations for different countries over different time periods. Some of the researchers also had thrown light on the effects of exchange rate dynamics on macroeconomic performance of the country. A brief review of studied carried out abroad and in India is presented below.

STUDIES OF DETERMINANTS OF EXCHANGE RATES

(i) International Status

Clarida and Gali (1994) empirically investigate the sources of real exchange rate fluctuations in Germany, Japan, Canada and Britain using the data since the collapse of Breton Woods. They found that nominal shocks explained a substantial part of the variance of the change in dollar-DM and dollar-yen real exchange rates. They stated that in case of Canada and Britain, demand shocks explain the majority of the variance in real exchange rate fluctuations, while supply shocks explain very little. Evans and Richard (2002) examined the sensitivity of spot rate to order flow by taking bilateral transactions and Spot rates (Deutsche Mark/ Dollar or Yen/ Dollar) that occurred from between May to August 1996. They found order flow as a major determinant of spot rate because it conveys right information.

Bhundia and Gottschalk (2003) investigated the sources of fluctuations in the Rand US dollar exchange rate using an empirical exchange rate model which identifies aggregate supply, aggregate demand, and nominal disturbances as possible sources for exchange rate fluctuations. They stated that nominal disturbances explain by far most of the rand depreciation. They also mentioned that financial market developments are the most likely source of the depreciation. Wang (2004) studied relative importance of different types of

macroeconomic shocks responsible for fluctuations in the real exchange rate. He observed real relative demand shocks as most important sources of fluctuations in the real exchange rate over the period 1980 to 2002, while supply shocks had been the main factors accounting for variations in relative output and relative prices. He stated that supply shocks were at least as important as nominal shocks in contributing to real exchange rate variations in China.

Chen (2004) followed Clarida and Gali (1994) to estimate a structural VAR model on quarterly data from 1974 to 2002 of USA, Canada, Germany, Japan and the UK, and stated that the variance of real exchange rates can be attributed more to monetary shocks when the sample span is extended. Cappiello and Roberto (2005) studied the arbitrage relationship, the Uncovered Equity Return Parity (URP) condition to explain the dynamics of exchange rates in developed countries. In a sample that consisted data of European and US equity market and Forex market from January 1991 to December 2003 they applied GMM estimator with a heteroskedasticity and Autocorrelation Consistent (HAC) covariance matrix, the Mean Square Error and Modified Diebold-Mariano. The results revealed that a relative increase in equity returns in the euro area, the UK, Switzerland, Germany and France vis-à-vis US is associated with an appreciation of the US dollar against the currencies of these economies. Rahman and Barua (2006) attempted to analyze the underlying causes and impact of the recent developments in the foreign exchange and money markets of Bangladesh using the data from 2005 and 2006. They observed that depreciation and volatility of exchange rate depends on various components of foreign exchange market.

Mokoena (2008) considered net average turnover in place of order flow to analyze microstructure market. He concluded that net average turnover is a feasible variable in determining exchange rate. Thabo (2008) used microstructure approach (given by Lyon, 1991) to develop a hybrid exchange rate model on Southern African Development Community (SADC) countries. In the model based on Evan's (2001) approach he included macro and microeconomic fundamentals, viz., interest rate differentials, money supply, order flow (net average daily turnover), commodity price index, dealer net position, risk (spread between South Africa's dollar denominated bonds and global emerging market bond index) and some other micro and macro determinants. He stated that though microstructure approach is a feasible way of finding reliable determinants of exchange rate, but, it can be enriched by accommodating some components of foreign exchange market.

Inoue and Hamori (2009) empirically analyzed the sources of the exchange rate fluctuations in India using monthly data from January 1999 to February 2009. By employing structural VAR model that included three variables, viz., nominal exchange rate, real exchange rate and the relative output they concluded that real shocks were the main drivers of the fluctuations in real and nominal exchange rates, indicating that the central bank could not maintain the real exchange rate at its desired level over time. Erjavec, Boris and Sasa (2012) in an attempt to

study sources of real exchange rate fluctuations in Croatia also used same variables on monthly data from January 1998 to March 2011. they found that Fluctuations in the real exchange rate are mostly due to real demand shocks as they explains the fluctuation in Forex rate up to 80 percent, whereas supply shocks explain a small proportion of the variance in real exchange rates.

Zhang, Chau and Zhang (2010) in their study that included data on EMBI, index of order flow, CNY/ USD exchange rate for a period from July 2005 to June 2009 of Chinese economy applied VAR model. The results indicated that there was unidirectional causality from order flow to exchange rate movements, and the order flow explains approximately 27 percent of the variations in CNY/ USD exchange rate. In another study Zhang, Zhang and Muhammad (2013) tried to find association of exchange rate and order flow using data of real transaction for Deutsche mark/ US dollar exchange rate. The results of analysis done using Grangers causality and OLS estimation indicated intra-day high-frequency order flow a valuable determinant for the contemporaneous exchange rate returns.

Tariffi (2012) analyzed the effect of real determinants (terms of trade, government expenditure, net foreign assets, trade balance or openness level, productivity) and tariffs (TAR) on the real exchange rate (RER) equilibrium in short and long period in India. He applied classical lineal stationary, cointegration and OLS with error correction mechanism, and found that net foreign assets and level of trade openness have negative effect on RER after 2 and 3 lags respectively. The results of short term regression indicated a positive relationship between TAR and RER; and public expenditure and RER. Ali et al. (2013) examined the causal relationship between stock prices and exchange rates in BRICs countries. They applied a bivariate granger causality test on weekly forex rates and stock prices from May 2003 to September 2010 divided in pre-crisis, crisis and post-crisis period, and found a unilateral and bilateral relationship between the variables in all countries except china.

Akther, Mohammad, and Saidjada (2013) also tried to analyze sources of exchange rate fluctuations in Bangladesh. They applied ADF unit root tests and SVAR on monthly data of three variables – relative output, relative prices and the real exchange rate for a period from January 2003 to June 2012. The results indicated that both the demand shocks and supply shocks are responsible for sharp depreciations of Bangladesh's exchange rate. Kayhan, Tayfur and Ahmet (2013) applied non-linear causality test and frequency domain causality test to analyze relationship between interest rates and exchange rate in BRIC-T Countries. They found that Interest rate affects exchange rate in only China and that too in long run only.

(ii) National Status

Michael and Pattanaik (1998) focused on exchange rate management in India. They considered data on nominal money stock, wholesale price indices, industrial production

indices, NEER, inter-bank call money rates, and domestic inflation indices (CPI) of 36 major trading partners of India for a period from April 1990 to March 1998. Using ADF unit root tests and cointegration they found that In comparison with the previous episode of exchange rate volatility during August 1995 to February 1996 there was a relatively greater degree of management in the exchange rate regime during September 1997 to March 1998. They concluded that exchange rate policy in India has been actively supportive of the external sector target in terms of a sustainable level of current account deficit.

Dash and Bhole (2007) analyzed the interest rate affect over the exchange rate in phased manner during period from January 1991 to December 2005. They observed positive relationship between interest rate and foreign exchange rate during "High" Interest Rate period (January 1991 to March 1997) and not in other case, the "Low" or "Soft" Interest Rate period (April 1997 to December 2005). Agrawal, Srivastav and Srivastava (2010) analyzed the relationship between Nifty returns and Indian Rupee-US Dollar exchange rates during October 2007 to March 2009. He found a negative unidirectional relationship running from the former towards the latter. Goyal (2010) discussed the changing INR trends over the reform period with regard to exchange rate determinants. He stated that during times of crisis in the country capital inflows were the major influencing factor for the exchange rate.

Dua and Ranjan (2010) examined the forecasting performance of the monetary model and its various extensions developed by researchers in the past. They developed a model for forecasting exchange rate in India that included several monetary factors considered in earlier models and also some more real factors affecting exchange rate. The model included monthly data on US and Indian differential of Treasury bill rate, inflation rate, money supply, industrial production index, trade balance, three month forward premia, volatility of capital inflows, order flow and government intervention for a period from July 1996 to December 2006. The authors found model performance and forecasting results much accurate.

After introduction of currency derivative in 2008 the currency spot market has become more volatile. Sharma (2011) tried to find relationship between the volatility in exchange rate in the spot market and trading activity in the currency futures. In analysis conducted using Granger causality test, ARCH and GARCH model, he found that volatility of spot exchange rate after the introduction of currency futures is greater than volatility of spot exchange rate before the introduction of currency futures. Sharma did not consider the global crisis affect, which might give different findings, because the future market were accepted in India in the year 2008, when the global financial crisis effect took place in all over the world. Tripathy (2013) stated that the market forces (demand and supply) are the major determinants of exchange rate in India. He focused on the government intervention in exchange rate market and found that the RBI intervenes occasionally to manage the exchange rate but the major influencing factors are the market forces.

STUDIES OF EFFECTS OF EXCHANGE RATES

(i) International Status

Exchange rates across the world have fluctuated widely particularly after collapse of the Bretton woods system of fixed exchange rates in 1971. Since then, there has been extensive debate about the possible effects of exchange rate volatility on international trade, investment and other macroeconomic indicators.

Hooper and Kohlhagen (1978) examined the effects of exchange rate uncertainty on the volume of trade among developed countries. They did not find any significant impact of exchange rate volatility on the volume of trade. Cushman (1983) found negative relation between exchange rate volatility and volume of trade in the developed countries. Bailey et al. (1986) investigated the effect of exchange rate volatility on export of leading OECD countries which included Canada, France, Germany, Italy, Japan, UK and US. The study revealed that exchange rate volatility has positive effect both in long run and short run. Exchange rate movement has a positive relationship with the productivity growth. In a well known book on global competitiveness and growth, Porter (1990) exclaimed that depreciations can reduce growth, and an overvalued exchange rate can sometimes contribute to productivity growth by forcing productivity increases in the tradable sector. Qian and Virangis (1994) in a study on the impact of exchange rate volatility on trade in six countries (Australia, Canada, and Japan and positive for United Kingdom, Sweden, and Netherlands) indicated that there exists a negative link between exchange rate volatility and export volumes.

Many studies proved negative association between exchange rates fluctuations and foreign direct investment. Some researchers are of the view that revaluation or devaluation of a currency also affects the association between exchange rates fluctuations and FDI. In this connection Campa (1993) found that the volatility in exchange rate negatively affects FDI for the US, and Benassy-Quere, et al (2001) also proved the existence of a negative association between the two variables in developing countries. Richard (2001) viewed that real exchange rates affect productivity growth in both the short and long term. In the short run, he found results consistent with the competitiveness hypothesis, which suggests that exchange rate depreciations boost productivity growth in the short run. Though, sustained real exchange rate depreciation could have negative consequences for long-term productivity growth.

Mustafa and Nishat (2004) investigated the effect of exchange rate volatility on export growth between Pakistan and other leading trade partners such as SAARC, ASEAN, European and Asia Pacific regions. They found that exchange rate volatility had negative impact on export flows of Pakistan with United Kingdom, United States, Australia, Bangladesh and Singapore. While in the case of India and Pakistan, there exists only long-run impact and no short run relationship. In the case of New Zealand and Malaysia, no relationship was found.

Kiyota and Urata (2004) observed in Japan, that the depreciation of the Yen enhanced FDI while the increase in exchange rate uncertainty discouraged FDI at both aggregated and disaggregated industry levels. Chen, et al (2006) also found an inverse relationship of exchange rate uncertainty to the outflow of FDI of companies.

From a different perspective, Schnabl (2008) introduced that the stability of exchange rates has a positive association with the growth of international trade and international capital flows at the EMU periphery. Rey (2006) examined the impacts of nominal and real effective exchange rate volatility on exports of 6 Middle Eastern and North Africa (MENA) Countries to 15 member countries of the European countries (EU). The empirical results showed that MENA exports and exchange rate volatility are positively related in the case of Algeria, Egypt, Tunisia and Turkey in the long-run but negatively related with Israel and morocco. Further, the MENA exports and exchange rate volatility is positively related in the short-run for Morocco, Algeria, Tunisia and Turkey but negatively related for Egypt and Israel.

Fang et al (2006) investigated the effect of exchange rate movement on exports of Eight Asian countries. The study revealed that real exchange rate depreciation has significant impact on exports for all countries except Singapore whereas exchange rate risk proves positive for Malaysia and Philippines but negative for Indonesia, Japan, Singapore, Taiwan and no effect for Korea and Thailand. Xing (2006) found that the exchange rate between China and Japan has a critical role in determining the FDI of Japan, and the depreciation of Yuan encouragingly affected the export FDI of Japan and improved China's competitiveness. Jeon and Rhee (2008) in a study on determinants of Korea's foreign direct investment from the United States during 1980-2001 evidenced the link between the FDI inflows in Korea and the real rate of exchange.

Chong and Tan (2008) found little evidence of a connection between volatility in exchange rate and macroeconomic variables in the short-run in Southeast Asian countries, but in the long-run, an association is observed. Aliyu (2008) examined the impact of exchange rate volatility on non oil export trade in Nigeria. The study observed that exchange rate volatility was found to have an adverse effect on non oil exports in the long-run while in the short run, there is positive relationship. The study of Alam and Ahmad (2011) based on the ARDL analysis showed that real exports are cointegrated with volatility of real effective exchange rate. The study results revealed volatility of real effective exchange rate adversely affects the Pakistan's exports. Wang Danqing (2013) analyzed long-term and short-term connection between exchange rate uncertainty and foreign direct investment (FDI) in BRIC countries. The results of his study indicated that there exists a negative long-run relationship between exchange rate volatility and foreign direct investment, while there is no evidence of short term connection between exchange rate uncertainty and FDI.

(ii) National Status

In the Indian context Virmani (1991), Joshi and Little (1994) and Srinivasan (1998) observed a negative and significant relationship between the real exchange rate and merchandise aggregate exports. Chowdhury (1993) investigated the impact of exchange rate volatility on the trade flows of the G-7 countries in context of a multivariate error-correction model. They found that the exchange rate volatility has a significant negative impact on the volume of exports in each of the G-7 countries. Verena and Nawsheen (2011) empirically investigated the impact of real effective exchange rate volatility on the Mauritian export performance. The study results proved that exchange rate volatility has positive effects on exports in the short-run while in the long-run, the impact was negative.

Bal (2012) examined the effects of exchange rate volatility on India's export and found no statistical and significant relationship between the exchange rate volatility and export of the country. But, the short term disequilibrium of exchange rate was negatively affects the export of the country. Dhasmana (2012) analyzed the relationship between India's real exchange rate and its trade balance with her major trading partners using quarterly trade data for 15 countries. She found that real exchange rate volatility is negatively correlated with India's trade balance in the long run.

Srinivasan and Kalaivani (2012) tried to investigate the impact of exchange rate volatility on the real exports in India using the ARDL bounds testing procedure proposed by Pesaran et al. (2001). They used annual time series data on exchange rate volatility, real exchange rate, gross domestic product and foreign economic activity for the period from 1970 to 2011. The results confirmed that real exports are cointegrated all the variables under consideration, and the exchange rate volatility has significant negative impact on real exports both in the short-run and long-run, implying that higher exchange rate fluctuation tends to reduce real exports in India. Further, the real exchange rate has negative short-run and positive long-run effects on real exports. The empirical results also indicated that GDP has a positive and significant impact on India's real exports in the long-run, but the impact turns out to be insignificant in the short-run. In addition, the foreign economic activity exerts significant negative and positive impact on real exports in the short-run and long-run, respectively.

Cheung and Sengupta (2013) explored the effect of real effective exchange rate (REER) on the share of exports of Indian non-financial sector firms for the period 2000 to 2010. The findings of the study revealed that, on average there has been a strong and significant negative impact of currency appreciation as well as currency volatility on Indian firms' export, the firm-level accounting information and other macro variables have limited implications. The study also evidenced that the Indian firms respond asymmetrically to exchange rates.

THEORIES ON EXCHANGE RATE MODELING

Among various models to determine the exchange rate the first one is Purchasing Power Parity (PPP) Model of exchange rate. It states that arbitrage forces equalize the prices of goods internationally once the prices are measured in the same currency. Initially it was felt that PPP theory does not hold its relevance in short run but in long run, but, some researchers, e.g. Jacobson et al. (2002) and Dua and Ranjan (2010) found deviations from PPP even in the long-run. Harrod Balassa Samuelson (HBS) Model explains the productivity differentials as an important determinant to the exchange rate, higher productivity growth in the tradable sector would lead to a long-run increase in the real exchange rate. Chinn (1999) and Clostermann and Schnatz (2000) find that a model with productivity differentials better explains and forecasts exchange rate behaviour.

Failure of PPP model gave rise to Monetary Models of exchange rate, viz., Sticky Price Monetary Model and Flexible Price Monetary Model. Monetary Models took into account the possibility of capital/ bond market arbitrage as against goods market arbitrage assumed in the PPP Model. Further, in the monetary models, it is the money supply in relation to money demand in both home and foreign country which determine the exchange rate (Dua and Ranjan, 2010). The Flexible Monetary Model (developed by Frenkel, 1976) considers interest rate differential, inflation differential, money supply differential and output level for determining the exchange rate behaviour, while Sticky-Price Monetary Model includes nominal interest rate changes and its affect over the monetary policy (Dornbusch, 1976).

The Sticky-Price Monetary Model (Dornbusch, 1976) which assumes that money demand function stated that changes in the nominal interest rate reflect changes in the tightness of monetary policy. When the domestic interest rate rises relative to the foreign rate, it is because there has been a contraction in the domestic money supply relative to the domestic money demand without a matching fall in prices. The higher interest rate at home attracts a capital inflow, which causes the domestic currency to appreciate. Frankel (1979) argued that a drawback of the Dornbusch (1976) formulation of the sticky-price monetary model was that it did not allow a role for differences in secular rates of inflation. He developed a model that emphasizes the role of expectation and rapid adjustment in capital markets. The innovation is that it combines the assumption of sticky prices with that of flexible prices with the assumption that there are secular rates of inflation. This yields the real interest differential model (Dua and Ranjan, 2010). Hooper and Morton (1982) introduced the trade balance in the exchange rate determination equation of sticky price model. The model of exchange rate determination is further extended by Portfolio Balance Model that assumes imperfect substitutability between domestic and foreign assets. This model focuses on the interaction between the exchange rate, current account and wealth level.

After liberalization when the capital flows increased worldwide, it was also focused as a determinant of the exchange rate and included in the model of exchange rate determinant. When the relevance of information flow came into existence microstructure approach introduced. The microstructure theory of exchange rates provides an alternative view to the determination of exchange rates. Unlike macroeconomic models that are based on public information, micro-based models suggest that some agents may have access to private information about fundamentals or liquidity that can be exploited in the short-run. In microeconomic models of asset prices, transactions play a causal role in price determination (Evans and Lyons, 2001, 2007). Recently, Pami Dua and Rajiv Ranjan (2010) developed model which apart from variables considered in earlier models, also includes some more variables. The variables included in the model are Treasury bill differential, industrial production index differential, money supply differential, trade balance differential, inflation rate differential, forward premia, volatility of capital inflows, order flow, and government intervention.

MOTIVATION OF RESEARCH

A number of researchers in the past made attempts to develop models for forecasting exchange rate, some of them considered one or two variable or some more determinants of exchange rate. Some researchers considered monetary factors, while some were of the view that the real shocks are the main determinants of the exchange rate. The researcher believes that a combination of real and monetary models would create a new hybrid model which would be capable of producing much reliable and accurate prediction of exchange rates. As regards effects of exchange rate fluctuations on macroeconomic performance of the country, there are numerous studies which thrown light on association between exchange rate volatility and trade or foreign direct investment or productivity growth or stock market performance. Their results are diverse and ambiguous with some presenting significant connections between the two, whereas others showed impaired or no affiliation between them. The researcher is of the view that exchange rate fluctuations affect all these variables and some other variables also such as the revaluation or devaluation of local currency, the location decisions, and the trade and investment policy of a country. Present study will be an extension to earlier studies in the way that it will combine both real and monetary variables to develop a new hybrid model for accurate and reliable exchange rate forecasting. It will also throw light on the impact of exchange rate volatility on various macroeconomic performance indicators of the country.

RESEARCH DESIGN

OBJECTIVES

- To understand and examine various aspects concerned with Foreign Exchange Rate in India.
- To develop a Comprehensive Model to forecast Rupee-Dollar (INR-USD) Exchange Rate.
- To examine impact of fluctuations in Rupee-Dollar (INR-USD) Exchange Rate on India's Macro-economic Performance.

To achieve above mentioned objectives, the study will attempt to:

- Analyze chronicle of Rupee-Dollar (INR-USD) Exchange Rate.
- Understand Structure and Working of Foreign Exchange Market in India.
- Review Episode of abrupt fluctuations in INR-USD Exchange Rate and the Government policy interventions.
- Identify real and monetary factors that affect Exchange Rate.
- Develop a comprehensive model using econometric techniques to forecast Exchange Rate, and to check validity of the modal.
- Identify macroeconomic performance indicators affected by fluctuation in INR-USD Exchange Rate.
- Examine impact of fluctuation in INR-USD Exchange Rate on selected macroeconomic performance indicators.

DATA AND METHODOLOGY

Data: Secondary

Series: Quarterly Data for fourteen financial years (April 2001 - March 2014).
Data can be expended depending on availability of data.

Source: Theories and literature from Books, Journals, Reports, Working papers, News papers and official websites of Govt. of India/ RBI/ World Bank/ IMF etc.
Statistical data base of GOI/ RBI/ IBRD/ IMF etc.

Tools: The researcher plans to use following statistical and econometric tools.

- Basic Descriptives (e.g., Mean, SD, Skewness, Kurtosis etc.)
- Test of Non-stationarity (Augmented Dickey Fuller (ADF)/ Phillip Perron (PP)/ Dickey Fuller-Generalized Least Square (DF-GLS) test)
- Johansen Co-integration/ Granger Causality test
- Vector Autoregressive (VAR)/ Bayesian Vector Autoregressive (BVAR)
- Generalized Autoregressive Conditional Heteroskedasticity (GARCH)
- Root Mean Square Error (RMSE)/ Theil's U/ Diebold-Mariano (DM) test

Software: E-Views 7.0 and STATA 12.0

PROPOSED CHAPTER PLAN

Chapter 1- Introduction
Chapter 2- Review of Theories and Literature on Exchange Rate
Chapter 3- Forex Policy, Market and Rate: Structure and Pattern
Chapter 4- Modeling of Rupee-Dollar (INR-USD) Exchange Rate
Chapter 5- Analysis of the Impact of fluctuations in Rupee-Dollar Exchange Rate on India's Macro-economic Performance
Chapter 6- Findings and Suggestions

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